RMT

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June 4, 2010

Mr. Richard Boice
Remedial Project Manager
U.S. Environmental Protection Agency, Region 5
77 West Jackson Blvd.
Chicago, IL 60604

Subject: Third Five-Year Review of the Lemberger Site

Dear Mr. Boice:

The LSRG would like to thank you again for the opportunity to participate in the preparation of the Third Five-Year Review of the Lemberger Sites. Our primary concern with the document is that it appears to make conclusive, absolute statements regarding risks to private wells and the existence of identifiable fracture zones that are not justified by the data. In most cases we recognize that the data does not conclusively eliminate all possible future risk scenarios. However, based on years of monitoring, pumping and studying the contaminated plume, we believe ongoing monitoring will detect any increase in contaminant trends that could pose an actual future risk long before that risk become substantial, significant or imminent. In the vast majority of the 75 wells we are monitoring, contaminant trends are stable or declining, even since the pumping system was shut down. There are a handful of wells (literally three) where TCE contaminant trends are increasing. These wells may deserve special attention. But the modest contaminant increases observed in these aberrational wells do not justify a change in the current remedial approach, especially when the trends are considered in the context of the historic variability monitored in the plume and the LSRG's obligations and commitments to ongoing monitoring. At the very least, the 5 Year Review should formally acknowledge that while recent trends in a small number of wells, if continued, could create a risk in the future, that there are other equally plausible explanations for these trends that do not suggest any future risk.

We believe that the 5 Year Review should not unduly alarm the public by suggesting that the current data establishes that there are identifiable future risks, when in fact there is merely the possibility of a future risk, there are equally plausible explanations of current trends that do not suggest any future risk, and the ongoing, or revised, monitoring program will detect any actual risk in time for the LSRG to prevent contaminant contact with human or ecological receptors.

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Our responses to specific comments are as follows:

- **Comment 2:** Please identify the downgradient areas where CVOCs have declined since shut-down of the pump-and-treat.

  Response: Wells that show declines are found throughout the plume as indicated by the decreases in concentration at the following wells since shutdown of the pump and treat system: RM-3D,RM-7XXD, RM-8D, RM-203D, RM-204D, RM-208I, RM-208D, RM-209D, RM-210D, RM-213D (if the outlier is ignored), RM-214D, RM-305D, and RM-307D.

- **Comment 3:** The relatively constant CVOC concentrations in groundwater at the LTR northern boundary over the past 13 years, suggests that the source area containment at LTR has had little impact on CVOC releases in the source area. Please provide any documentation that demonstrates that groundwater contamination was reduced by the LTR source area containment actions. If you believe that the modeling supports your conclusion, provide the modeling or your model based calculations for review.

  Response: The LSRG does not agree that the source area containment was ineffective. EPA has never made such a statement in the past and should provide data and evidence that supports their position that removal of wastes, including the excavation and removal of 1380 drums has had "little impact on CVOC releases". The LSRG also disagrees that the CVOC concentrations have been stable since the source control actions were implemented. For instance, The 1, 1, 1-TCA concentration at RM-303D was 3000 µg/L in 1996 and is currently less than 1000 µg /L. The 1, 1, 1-TCA concentration at RM-209D was approximately 750 µg /L in 1996 and is currently less than 200 µg /L. The 1,1,1-TCA concentration at RM-307D was approximately 430 µg /L in 1996, rose to as high as 680 µg /L in 2000, and is presently consistently around 200 µg /L. These trends were presented in the MNA reports. Based on our interpretation of the mass of CVOCs recovered by the pump and treat system, these reductions are primarily the result of source control efforts at the LTR (drum removal, surface grading and capping) and MNA.

- **Comment 4, Comment 33:** Please explain how you reconcile these comments to your Comment 2.

  Response: We do not see a conflict in these statements and stand by our original point that our monitoring network is protective of human health and the environment despite the fractured and heterogeneous nature of the aquifer.

- **Comment 5:** RMT's potentiometric surface maps include RM-304D, which is screened in bedrock, in the perched water table. It is clear that the water levels measured in RM-304D on the east side of LTR agree much better with the perched water table than the rest of the bedrock water table. For this reason, there is a question whether there is continuity in the perched water table detected in bedrock at RM-304D to the west side of LTR. If so, it needs to be monitored.

Response: We do not believe that there is a second perched system in the bedrock, and EPA is correct in assuming that RM-304D is included in the water table map only because the data more closely fit the UGU data. Wells EW-1D, RM-7D, RM-209D, and RM-303D are true "water table" wells in that they are screened across the phreatic surface. Their water levels define the top of the aquifer.

- **Comment 6:** Evidence that fractures are significant include that in spite of the low permeability of the bedrock in the vicinity of LTR, CVOCs have migrated from the LTR at a rate of 500 – 900 feet per year, and formed a plume 1.5 miles long.

  Response: The significance of fractures cannot be proven or disproven and that is the point of our comment. As written, the LSRG believes this and other statements overstate the significance of a fracture network without acknowledging that the LGU and highly transmissive sediment/bedrock interface is an equally (if not more likely) pathway for the length of the plume. Again, the LSRG believes the groundwater monitoring network is protective and the tone of the document is such that the reader may miss that very important point.

- **Comment 7:** The model predicted the groundwater pumping rates that were necessary to achieve adequate groundwater capture zone based on the aquifer properties input into the model. The results for the pumping wells near LTR demonstrated that the aquifer properties utilized in the model were grossly inaccurate for predicting achievable pumping rates.

  These aquifer properties also impact groundwater movement and contaminant transport. As for the plume area, to the extent that it is defined, it has been defined by groundwater sampling. The conceptual basis of the model is incorrect because it assumes that groundwater in the bedrock behaves as like a porous media.

  Response: Suffice it to say that even slug and pumping tests used to estimate aquifer properties also assume that the aquifer is a porous medium. The overall conceptual model (UGU, CU, LGU, bedrock) is correct and our ability to monitor the extent of contamination is sound.

- **Comment 10:** See evaluation in Section VI.

  Response: Section VI is 25 pages long. It appears that EPA has buried its rationale for selecting to look at only six years of a 13 year monitoring record period in lengthy exposition. We believe that EPA's rational for ignoring the last 6 years or monitoring data needs to be clearly and concisely explained, or this discussion removed.

- **Comment 11:** Based on CVOC concentrations in source area monitoring and pumping wells, which have been relatively constant, it appears that migration of CVOCs from LTR has been relatively constant. The MNA data indicates that little reductive dechlorination occurs at or downgradient from the LTR northern boundary. The relatively constant daughter / parent ratios

from LTR to the far downgradient plume area, indicates that little biodegradation is occurring in this area, and the CVOC concentration reductions are result of dilution.

Response: The LSRG disagrees that source area concentrations have been relatively constant in the monitoring network (see response to comment response #3 above). Concentrations were consistent in the extraction network because the supply of contamination is diffusion limited. As for dilution, this can only occur through the mechanisms of dispersion and diffusion. The EPA comment implies mixing within the groundwater flow system, which could occur if there were turbulent flow within the aquifer (which is unlikely), and if that is occurring that would also be a physical mechanism for natural attenuation.

- **Comment 12:** From my cursory review of the data, it does not appear that BEHP detections are related to LL or LTR. However, this needs to be addressed systematically before a final decision is made on how extensively BEHP should be monitored.

  Response: We agree that BEHP (DEHP as per the WDNR) is not related to the site, and therefore strongly disagree that further study is required.

- **Comment 13:** I do not know that the wetlands are in contact with the UGS in the vicinity of LL. There appears to be a wetland (downgradient) of LL, but not to the east (upgradient). It is my understanding that, in general, uppermost aquifers are more aerobic than lower aquifers, but I have not reviewed data on stagnant perched aquifers overlain by wetlands.

  Response: EPA also observed the small wetland pond adjacent the groundwater treatment building that is full of organic material (decaying leaves, grass, etc.). A quick review of the topographic map (Figure 1 in the bedrock report) shows a large area of wetlands in the wooded area east (upgradient) of the LL.

- **Comment 14:** Riley Tar and other Superfund sites indicate that carcinogenic PAHs can cause extensive groundwater contamination.

  Response: That does not invalidate our comment that these compounds are of very low solubility and would be highly unlikely to be found in groundwater without first being found to contain the more soluble and mobile volatile constituents. The LSRG merely wanted this point made because although the findings that the MDLs for these compounds does indeed exceed the PAL or RSL this is not a significant finding with regards to human health risk.

- **Comment 16:** How did the CVOC contamination migrate 190 feet deep under very little vertical gradient if not through a vertical fracture or fractures?

  Response: As we indicated in Comment 16, transport could have been through porous rock, fractures, or a combination of those features. If the 5 Year Review is to be accurate, it should

acknowledge that fractures are merely one possible explanation regarding how the contamination migrated vertically at the site.

- **Comment 17:** I do not have immediate access to all 13 years of residential well monitoring data. Note that the pump-and-treat system was operating from 1997 - 2006, and EW-2D could have provided a barrier to further westward migration of CVOCs during that period of time.

  Response: We can again provide EPA with the data for GR-60R and GR-26, and we can assure you that neither well has had a confirmed detection over the 13 years of monitoring. EPA's comment regarding the alleged impact of pumping on the plume is discussed in our Comment #15.

- **Comment 19:** From my cursory review, it does not appear that the BEHP detections are related to the site. However, as far as I can tell, there has been no formal review or determination regarding this.

  Response: We agree that BEHP is not related to the site and question the usefulness of further study.

- **Comment 21:** My recollection is that an earlier report identified an inward gradient during each monthly monitoring while the leachate was being pumped. EPA will need to evaluate whether at least a seasonal outward gradient from LL is acceptable.

  Response: Please note that in March 2010 the water levels indicate an outward gradient:

  - OW-106B 832.3
  - OW-106A 831.82
  - RM-208S 829.82
  - LW-08 827.17

  In order to properly address this, the 5 Year Review would note that the seasonal condition occurs only at the extreme southeastern corner of the LL and, critically, adjacent monitoring wells do not indicate evidence of leachate migration through the slurry wall.

- **Comment 24:** From my review, B-2 was installed in the bedrock trough to test for DNAPL migration, not groundwater transport. There is no documentation in the report or plans that borings B-2, B-4, or B-5 were located to investigate groundwater transport in a bedrock trough. The report included no conclusion about use of the bedrock trough for groundwater control. Note a hydraulic conductivity of 0.2 cm/sec was measured at a fracture at B-5, and moderate hydraulic conductivities were measured in B-2 (generally exceeding 0.001 cm/sec in slug tests).

Response: It is our understanding that at least one of the borings was moved in response to a request from WDNR to investigate the trough. Although the investigation detected permeable fractures at some borings, none of the borings produced the large quantities of groundwater that would have warranted conversion to an extraction well. This was based on groundwater recovery rates conducted by the driller after the well was evacuated.

- **Comment 27:** Because a change in concentration was observed shortly after shut-down of pumping, it is reasonable to associate this change to the change in pumping. If RMT has documentation demonstrating that the changes in concentration could not be related to the change in pumping or has an alternative explanation, please provide it.

  Response: It is not possible to definitively determine that a change in concentration in a monitoring well is a result of turning off the pump and treat system. As stated in our original comment, the concentration of 1,1,1-TCA at RM-208D increased from 17 µg /L to 31 µg /L between the last two sampling events *prior* to shutdown and has decreased to as low as 11.4 µg /L *after* shutdown. Such variability is most likely due to the natural fate of CVOCs in the aquifer as established since the completion of source control activities. Decreases have also been witnessed at the wells listed in our response to EPA's Comment 2. These decreases are not the result of turning off the extraction system; rather they are the result of other factors. We believe that the slight increase cited by EPA is the result of similar natural variability. To suggest otherwise is merely supposition that does not properly belong in a Five-Year Review report.

- **Comments 28 and 29:** I agree that changes in concentration occurring about the same time as the shut-down of pumping merits scrutiny. Note that at the time of preparation of the draft five-year review report, groundwater data was only available to me through July 2008. The change in trends at RM-3I occurred about the same time as discontinuation of pumping in 2006. Prior to 2006, operation of EW-2D, EW-7I, and EW-7D could have been blocking contamination from reaching RM-3I. Please provide any documentation or evaluation that RMT has showing that operation of EW-4I and EW-4D could not divert contamination from RM-2I and RM-2D.

  Response: As discussed in out General Comment 1, we do not believe the changes in concentration observed in a few wells merits the conclusions drawn by EPA. However, since EPA has not reviewed the full body of data, we believe that it is inappropriate for the 5 Year Review to contain assertions, in fact mere speculations, that operation of the extraction system "blocked" contamination, There is no data to support such speculation.

- **Comment 32:** What is your explanation for the presence of a similar ratio of daughter to parent compound from the LTR source area to far downgradient wells? What is your proposed degradation mechanism for TCA and TCE considering the high DO, the lack of nitrate, manganese, iron and sulfate reductions?

Response: It is retardation, dispersion and diffusion instead of "dilution" as discussed in the MNA Report. There is no mechanism for mixing "clean" water with the plume. The present plume may be maintained by back-diffusion of CVOCs from the bedrock, not only in the source area (where it is most active), but also in the downgradient plume. The plume was emplaced at much higher concentrations initially, much of the source was removed and the correspondingly lower concentrations are being released throughout the plume extent.

- **Comment 33:** The uncertainty presented by the presence of fractures has to do with where the contaminants have migrated, and, therefore, affects protectiveness to receptors. However, the presence of unmonitored fractures does not invalidate DO, NO3, Mn, Fe, SO4, or daughter/parent ratios where the monitoring was performed. I do believe that we are monitoring at or near the most likely migration pathways.

  If we cannot interpret the MNA data, it appears that you are arguing that the major migration pathway is not being monitored, and we need a whole new monitoring well network.

  Response: This comment misstates our comment. We do not believe that major migration pathways are going unmonitored. There is no evidence to support this conclusion. Similarly, we do not believe that a new monitoring network is required. Our point is merely that fractured bedrock presents monitoring and pump and treat difficulties and complicate the ability to make simple conclusive statements, such as those contained in EPA's draft 5 Year Review.

- **Comment 34:** Please summarize the data that you believe indicates that the LTR source control measures have significantly reduced CVOC releases to groundwater. Note that, as you state in Comment 36, one of the primary conclusions from the groundwater monitoring is that CVOC concentrations near the LTR source area have not decreased.

  Response: EPA may have misread Comment 36 which states concentrations have not changed "since the shutdown of the system". Concentrations have decreased markedly since the source removal and control measures were undertaken. See our response to EPA's response to Comment #3 above.

- **Comment 36:** Please explain how you reconcile this comment with the statement in Comment 35 that "the shift of the plume to the west is a possibility". The apparent stabilization of CVOCs in a number of downgradient monitoring wells appears to indicate that more CVOCs have been migrating downgradient from the LTR northern boundary since shut-down of the pump-and-treat.

  Response: Comment 35 clearly stated that the plume shift (as postulated by EPA) "was a possibility" and went on to cast doubt on that assertion citing lack of data to support that conclusion. The amount of CVOCs that have been migrating from the LTR was well documented

in the remedial effectiveness report and the LSRG believes that shutdown of the pump and treat system has not significantly changed that.

- **Second of the last paragraph:** My understanding is that the meaning of risk includes "possible future risks". Therefore, the uncertainty in the monitoring network, and migration of CVOCs into the area where residential wells operate, add to the risk to residents even though the incremental risk can not (sic) be quantified.

  Response: Despite monitoring uncertainties we can virtually eliminate risk to receptors by monitoring their water at the exposure point, as we have been doing for over 13 years and will continue to do. In addition, through continued monitoring we can detect if the plume is behaving differently than it has which would raise our awareness to conduct additional study or response actions. The draft 5 Year Review contains statements that suggest that the contaminant plume has changed. The LSRG believes that these conclusions are not supported by the data. We respectfully submit that EPA is correct in bringing up the *possibility* that conditions have changed, but needs to acknowledge that their observations are based on cursory review and are meant only to increase awareness, since the site, as presently constituted and managed does not present a quantifiable risk, at present, or in the future provided monitoring continues.

If you have any questions, please call me at 608-662-5178.

Sincerely,

RMT, Inc.

Kristopher D. Krause, P.E.
Senior Project Manager

cc: Annette Weissbach - WDNR
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